ATENT SPECIFICATIC

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COMPLETE SPECIFICATION

Improvements in or relating to Valves Automatically Operable to Prevent Excessive Flow of Gases

We, PHILIPS ELECTRICAL INDUSTRIES LIMITED, of Spencer House, South Place, Finsbury, London, E.C.2, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to automatic devices for preventing excessive flow of gases from one chamber to another, which chambers are normally in direct communication with each other. Such devices, are used in emergencies, for example in gauge glasses of steam boilers to prevent steam from escaping from the boiler in case of breakage of the gauge glass. They may also be used, for example, in gas cylinders in which it is necessary to ensure that the gases contained in the cylinder, and which in most cases are under high pressure, do not escape when the reducing valve or the shutter, which in most cases is provided, becomes defective. The invention is also applicable to some electro-technical devices such as electron-microscopes. For such microscopes use may be made of a construction constituted by a glass vessel and a metallic vessel which are in free communication with one another and both of which are exhausted. The glass vessel is surrounded by a chamber in which a high pressure exists. If the glass vessel implodes, there is a great possibility that the penetrating gases take along glass particles which may find their way into the interior of the microscope and thus cause damage. Finally the invention is applicable to exhausting devices.

The invention is characterized in that an automatically operating device of the above-mentioned kind comprises a main duct between two chambers, which includes a restricted portion comprising two intersecting ducts subtending between them an angle of less than 90° and meeting at a point in the main duct facing the chamber of lower pressure, one of the said intersecting ducts constituting a free passage through the main duct whilst the other intersecting duct is closed by a spherical member which is retained in position in the duct by a detent device until such time as the difference in pressure between the two chambers exceeds a certain value upon which the spherical member is released to close the communication between the two chambers.

In one embodiment of the invention, the detent device is subject to the action of a spring and the device as a whole is so constructed that the centre lines of one of the intersecting ducts and the main duct coincide, said intersecting duct, at least in part, having a diameter smaller than that of the other intersecting duct. A device of this form offers the advantage that the manufacture is simple, since the ducts may be provided by a simple drilling operation.

It is advantageous if, in another embodiment of the invention, the restricted portion facing the chamber of higher pressure has a groove which is inclined with respect to the longitudinal axis of the main duct and into which both the intersecting ducts open and of which the deepest point is adjacent the debouchement of the duct having the spherical clousure therein, the width of the groove preferably being equal to the diameter of the spherical member. In this embodiment of the invention it is possible for the spherical member to be returned to the duct, having the detent device therein, by removing the vessel or chamber to be protected and pushing the member over the detent.

In order that the invention may be readily carried into effect, one example will now be described in detail with reference to the accompanying drawings in which part of an electron - microscope is shown and in which:—

Figure 1 shows three chambers, the communication between two of which includes an automatically-operating device according to the invention and

Figure 2 shows the automatically-operating device on an enlarged scale.

A glass vessel or chamber 1 communicates by means of a duct 2, hereinafter referred to as the main duct, with a metallic vessel or chamber 3. The vessel 1 and duct 2, which are in free and direct communication with one another, are both exhausted. The vessel 1 is enclosed by an outer metallic vessel 4, in which a pressure of, for example, 10 atmo-

[Price 2/8]

spheres prevails. The communicating duct 2 includes a member 5, which has two intersecting ducts 6 and 7, which meet at an acute angle, as shown. The duct 6 has a reduced portion 8 of which the centre line coincides with that of the main duct 2. A ball 9 is provided in the duct 7. The ball 9 is retained in the duct 7 by means of a detent 10, which is subject to the action of a spring 11. The latter is compressed by an adjusting screw 12, which is threaded into an aperture 13 having corresponding screw threads. The member 5 furthermore has a groove 15, into which the ducts 6 and 7 open and of which the width is equal to the diameter of the ball 9. The operation of the device is as follows:—

When the vessel 1 implodes, the gases contained in the vessel 4 and which are under high pressure flow through the ducts 6 and 8 to the interior of the vessel 3. In this case there is a risk of glass particles being taken along. Furthermore, the vessel 3 cannot resist a high pressure. Due to the high pressure which suddenly prevails in the vessel 1 and duct 2, the ball 9 is urged into the reduced duct 8, since the detent 10 is then pushed away against the action of the spring 11. This movement of the ball 9 is furthermore assisted in that reduced pressure occurs under the ball 9 due to the rapid flow of the gas in the ducts 6 and 8. The ball finally comes to rest in the converging part of the duct 6, which in effect forms a seat 14, thus closing the direct and free communication between the vessels 1 and 3. When it is required to return the ball 9 to the duct 7, this may be effected by loosening the connection between vessel 3 and the main duct 2 and pushing the ball into the duct 6 by means of a pin. As soon as the ball has reached the groove 15 and is free from the duct 6, it rolls over the inclined surface and into the duct 7, wherein it is retained again by the detent device 10.

What we claim is:—

1. An automatic valve for preventing excessive flow of gases from a chamber of higher pressure to another of lower pressure, which chambers are normally in direct and free communication, characterized in that the device comprises a main duct between the two chambers which duct includes a restricted portion comprising two intersecting ducts subtending between them an angle of less than 90° and meeting at a point in the main duct facing the chamber of lower pressure, one of the said intersecting ducts constituting a free passage through the main duct whilst the other intersecting duct is closed by a spherical member which is retained in position in the duct by a detent device until such time as the difference in pressure between the two chambers exceeds a certain value upon which the spherical member is released to close the communication between the two chambers.

2. An automatic valve as claimed in Claim 1, characterized in that the detent device is subject to the action of a spring.

3. An automatic valve as claimed in Claim 1 or 2, characterized in that the centre lines of one of the intersecting ducts and the main duct coincide, said intersecting duct having a converging portion in its bore adapted to form a seat for the closure member after its release from the detent member.

4. An automatic valve as claimed in any of the preceding claims, characterized in that the restricted portion in the main duct, facing the chamber of higher pressure, has a groove which is inclined with respect to the longitudinal axis of the main duct and into which both the intersecting ducts open and of which the deepest point is adjacent the debouchement of the duct having the spherical closure member therein, the width of the groove preferably being equal to the diameter of the said spherical member.

5. An automatic valve for preventing excessive flow of gases from one chamber to another, substantially as herein described and as illustrated in the accompanying drawings.

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700.449 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

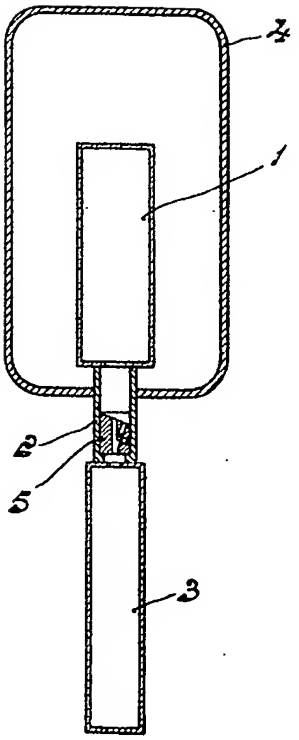

Fig. 1

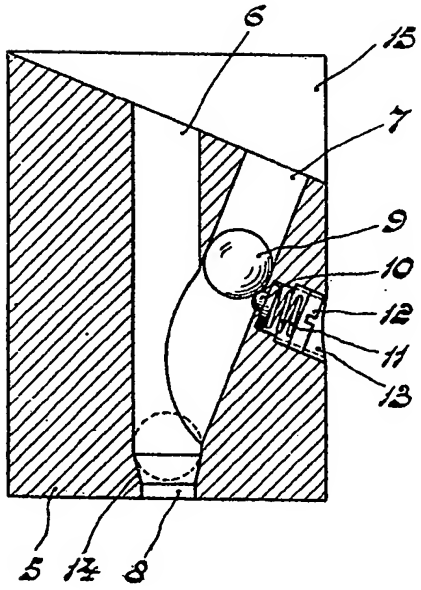

Fig. 2